REMARKS

Claims remaining in the present patent application are numbered 1-34. The rejections and comments of the Examiner set forth in the Office Action dated July 1, 2005 have been carefully considered by the Applicants. Applicants respectfully request the Examiner to consider and allow the remaining claims.

37 C.F.R. 1.83(a) Drawing Objection

The drawings are objected to under 37 CFR 1.83(a) in that the drawings must show every feature of the invention specified in the claims. In particular, the objection refers to the phrase "wherein each node in said plurality of web server nodes can perform as said front end node depending on which we server node is selected in establishing said TCP/IP communication session." Applicants have reviewed the drawings of the present Application and respectfully submit that the drawings of the present invention show the above listed features of the invention as specified in the claims.

In particular, Applicants respectfully assert that the present application fully supports a web cluster in which "[e]ach node can operate as a front-end node that receives a web request, or as a remotely located back-end server node that receives a forwarded web request for processing."

(see Summary, page 9, lines 3-6). Figures 4, 6, and 8 each support and illustrate network architectures that implement the TCP frequent-handoff mechanism in which each node in a web cluster can operate as a front-end node or back-end node, and can perform as the front end node depending on which web server node is selected in establishing the TCP/IP communication session, as recited in independent Claims 1, 13, and 25.

Figure 4 illustrates an architecture 400 that includes a web cluster defined by web server-1 450, web server-2 452, web server-3 454, on up to web server-n 456. In the web cluster of Figure 4, "the content-aware distribution is performed by each node . . . . Thus, each server in a cluster may forward a request to another node . . . using the TCP frequent-handoff mechanism." (See page 21, lines 1-5). In addition, it is further stated in relation to Figure 4 that "the clients directly contact the distributor at the front-end node, for instance via a round-robin DNS mechanism." As such, as shown in Figure 4, one of the nodes in a web cluster is selected via a round-robin DNS mechanism, and is able to then perform content-aware distribution to forward the request to another node. That is, the selected node performs as a front-end node to distribute the request to a back-end node in the web cluster. For illustration, Figure 4 shows server-1 selected as the front-end node in one example.

More particularly, Figure 6 illustrates a cluster architecture 600 in which each node in the web cluster (including web servers 630, 640, and 650) "has the same functionality." (see page 28, line 28). In particular, "each node can act as a front-end node and/or a back-end web server in providing TCP frequent-handoff functionality." (See page 29, lines 1-3). The front-end node is selected from the cluster architecture 600 using the switch 610, or through a round-robin DNS scheme. That is, each node in the cluster architecture 600 can operate as a front-end node or a back-end node, and as such, each node can perform as the front-end node depending on which web server node is selected in establishing the TCP/IP communication session.

Moreover, Figure 8 illustrates nodes representative of any of the nodes in a web cluster, for example the web clusters of Figures 4 or 6. Figure 8 shows a front-end node and a back-end node of a web cluster. It is particularly stated that every node in the web cluster can operate as a front-end node or a back-end node, as follows:

> Every node or server computer in the web cluster is homogeneously structured in order to implement the TCP frequent-handoff mechanism. Each node can operate as a front-end server node that receives a web request, or as a remotely located

back-end web server that receives a forwarded web request for processing. (See page 30, lines 21-26).

That is, Applicants respectfully assert that each node in a web cluster as represented in Figure 8 can operate as a "front end node depending on which web server node is selected in establishing said TCP/IP communication session."

Thus, Applicants respectfully assert that the drawings of the present Application show every feature of the invention specified in the claims, and as such overcome the 37 CFR 1.83(a) objection. Applicants respectfully request reconsideration of the drawings in the present Application.

35 U.S.C. §112 Rejection

Claims 1-34 have been rejected under 35 U.S.C. 112, first paragraph as failing to comply with the written description requirement. Namely, the claims are rejected because they contain subject matter which is not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventors, at the time the application was filed, had possession of the invention. Applicants respectfully traverse the rejection for the following reasons set forth below.

In particular, claims 1, 13, and 25 recite the limitation of, "wherein each node in said plurality of web server nodes can perform as said front end node depending on which web server node is selected in establishing said TCP/IP communication session." Applicants have reviewed the specification of the present Application and respectfully submit that the claims contain subject matter which is described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventors, at the time the application was filed, had possession of the invention.

First, Applicants respectfully assert that embodiments of the present invention disclose that each node in a web cluster can operate as a front-end node or as a back-end node, as stated in the present specification, as follows:

> Every node or server computer in the web cluster is homogeneously structured in order to implement the TCP frequent-handoff mechanism. Each node can operate as a front-end server node that receives a web request, or as a remotely located back-end server node that receives a forwarded web request for processing. (See Page 9, lines 1-6).

As such, the summary specifically states that each node is able to perform front-end server functionality.

More particularly, the node that is selected as the front-end server establishes a TCP/IP communication session, as follows:

> For remote processing of web requests, TCP state migration begins with establishing a TCP/IP communication session between a client computer and a front-end node. (See page 9, lines 18-20)

As such, each node in the web cluster is able to operate as a front-end server. Also, when a particular node is selected as the front-end node, that node performs front-end functionality to establish a TCP/IP communication session between the client computer and the front-end node.

As stated in the argument in defense of the drawings above, Figure 4 provides an example of a network or web cluster architecture in which content-aware distribution is performed by each node in the web cluster. Specifically, the text accompanying Figure 4 includes the following:

> For example, a network architecture 400 that implements the TCP frequent-handoff mechanism is shown in Figure 4. Embodiments of the present invention consider a web cluster in which the content-aware distribution is performed by each node in a web cluster. Thus, each server in a cluster may forward a request to another node based on the request content using the TCP frequent-handoff mechanism. (See page 22, lines 1-4)

As such, Applicants respectfully assert that each node in a web cluster is able to perform content-aware distribution. As such, each node when acting as a front-end node is able

to forward requests to another node (a back-end node) using the TCP frequent hand-off mechanism so that the back-end node can service the web request coming from the client. As a result, the content-aware request distribution mechanism implemented within a web cluster enables "smart, specially tailored routing inside the web cluster." (See page 18, lines 22-24).

The front-end node is selected from the plurality of nodes in a web cluster to communicate with a client. For instance, in one embodiment the front-end node is selected via a round-robin DNS mechanism, and is able to then perform content-aware distribution to forward the request to another node. (See page 23, lines 4-8). In another embodiment, the front-end node is selected through a switching capability that acts a load balancer to select one of the nodes as the front-end node. (See page 27, line 25).

Figure 6 illustrates a cluster architecture 600 that supports a network architecture implementing a TCP frequent-handoff design. (See page 27, lines 7-8). In particular, each node in the cluster architecture of Figure 6 has the same functionality and can act as the front-end node or the back-end node, as stated below:

> The specifics of this cluster architecture is that each node in a cluster has the same functionality. As such, each node combines the function of distributor and a web server. In other words, each node can act as a front-end node and/or a back-end web server in providing TCP frequent-handoff functionality.

That is, once a node in the web cluster is selected as the front-end node, that node is able to perform front-end functionality since each node in the web cluster is able to perform both front-end and back-end functionality. (See page 29, line 24-25). As such, the front-end node is able to transfer the web request from the client to a back-end node using the TCP frequent handoff design.

Furthermore, Figure 8 illustrates generic nodes in a web cluster that acts as a front-end node or as a back-end node. It is particularly stated that every node in the web cluster can operate as a front-end node or a back-end node, as follows:

> Every node or server computer in the web cluster is homogeneously structured in order to implement the TCP frequent-handoff mechanism. Each node can operate as a front-end server node that receives a web request, or as a remotely located back-end web server that receives a forwarded web request for processing. (See page 30, lines 21-26).

That is, Applicants respectfully assert that each node in a web cluster as represented in Figure 8 can operate as a "front end node depending on which web server node is

selected in establishing said TCP/IP communication session."

Thus, Applicants respectfully assert that the independent Claims 1-34 contain subject matter which is described and supported in the specification in such a way as to reasonably convey to one skilled in the relevant at that the inventors, at the time the application was filed, had possession of the claimed invention, and as such, overcome the 112, first paragraph, rejection. Applicants respectfully request reconsideration of claims 1-34 in the present Application.

35 U.S.C. §102 Rejection

The present Office Action rejected Claims 1, 8-10, 13, 20, 22-25, 32, and 33 under 35 U.S.C. 102(e) as being anticipated by Anerousis et al. (U.S. Patent No. 6,760,775). Applicants have reviewed the above cited reference and respectfully submit that the present invention as recited in Claims 1, 8-10, 13, 20, 22-25, 32, and 33 is neither anticipated nor rendered obvious by the Anerousis et al. reference.

Independent Claims 1, 13 and 25

Applicants respectfully point out that independent Claim 1, 13 and 25 each recite that the present invention includes, in part:

> [E]stablishing a TCP/IP communication session between a client computer and a first bottom TCP (BTCP) module located below a first TCP module in a first operating system at a front-end node, said front end node part of a plurality of web server nodes that form a web server cluster containing information, said TCP/IP communication session established for the transfer of data contained within said information, wherein each node in said plurality of web server nodes can perform as said front end node or a back-end node depending on which web server node is selected in establishing said TCP/IP communication session . . . (Emphasis Added)

The present invention pertains to methods for TCP state migration between web server nodes. In particular, independent Claims 1, 13, and 25 recite that each node in a plurality of web server nodes can act as a front end node in establishing a TCP/IP communication session with a client, or as a back-end node to process the web request from the client. That is, a node in the web server cluster that includes the plurality of web server nodes is not dedicated as being the front end node. Also, each node can act as a front-end node, or as a back-end node. As such, depending on which web server node is selected as the front

end node, the present invention is capable of migrating a first TCP state of the front end node to the back-end node.

Applicants respectfully note that the prior art reference, Anerousis et al., does not teach nor suggest the present method of TCP state migration in which each node in the plurality of web server nodes can act as the front end node or as a back-end node, as claimed in independent Claims 1, 13, and 25 of the present invention.

In contrast to independent Claims 1, 13, and 19 of the present invention, the Anerousis et al. reference, discloses a system, method, and apparatus for network service load and reliability management. In particular, the Anerousis et al. reference in various embodiments employs a network specific service level router (SLR) cluster, system specific SLR cluster, and site-specific SLR cluster, singly or in combination, to route a request to a particular host server.

The network-level SLR selects a system specific SLR cluster 510, 610 or 710. The system specific SLR cluster directs a network service request to a particular site-specific SLR cluster that is associated with at least one host server for providing the requested network service. The site-specific SLR cluster directs the service request to a particular host server within a physical host site.

That is, Anerousis et al. reference utilizes dedicated modules (e.g., the system and site specific SLR clusters) for routing the network requests to a particular server.

In particular, each of the network, system, or site specific SLR clusters performs routing functionality, and does not specifically perform as a front-end node used for establishing a TCP/IP communication session. More particularly, each of the network, system, or site specific SLR clusters does not have the capability of performing as either a front-end node or as a back-end node, as is recited in independent Claims 1, 13, and 25 of the present invention.

On the other hand, the present invention claims a web server cluster for providing information, or servicing network requests, where each node in a plurality of web server nodes of the web server cluster can act as a front end node in establishing a TCP/IP communication session with the client, and as a back-end node for processing the web request from the client, as recited in independent Claims 1, 13, and 25. As such, the present invention as claimed does not require dedicated modules for routing a request to a particular host server to service the request, as disclosed in the Anerousis et al. reference. That is, each of the nodes in the web cluster is able to function as both a front-end node or as a back-end node, depending on

which node is selected as the front-end node and which node is selected to process the web request. That is, depending on which web server node is selected as the front end node, the present invention is capable of migrating a first TCP state of the front end node to the back-end node, where the back-end node provides for processing the web request and the transfer of data.

Thus, Applicants respectfully submit that the present invention as disclosed in independent Claims 1, 13, and 25 is not anticipated by the Anerousis et al. reference, and is in a condition for allowance. In addition, Applicants respectfully submit that Claims 2-12 which depend from independent Claim 1 are also in a condition for allowance as being dependent on an allowable base claim. Also, Applicants respectfully submit that Claims 14-24 which depend from independent Claim 13 are also in a condition for allowance as being dependent on an allowable base claim. Further, Applicants respectfully submit that Claims 26-34 which depend from independent Claim 25 are also in a condition for allowance as being dependent on an allowable base claim.

35 U.S.C. §103 Rejection

The present Office Action rejected Claims 2, 14, and 26 under 35 U.S.C. 103(a) as being unpatentable over

Anerousis et al. in view of Munger et al. (U.S. Patent No. 6,502,135). Also, Claims 3, 4, 5, 15-17, and 27-29 are rejected under 35 U.S.C. 103(a) as being unpatentable over Anerousis et al. in view of Munger, and in further view of Albert et al. (U.S. Patent No. 6,775,692). In addition, Claims 6, 7, 11, 18, 19, 21, 30, and 31 are rejected under 35 U.S.C. 103(a) as being unpatentable over Anerousis et al. in view of Albert et al. Applicants have reviewed the above cited references and respectfully submit that the present invention as recited in Claims 2-7, 11, 14-19, 21, 26, 27, 29, 30, and 31 is neither anticipated nor rendered obvious by the Anerousis et al. reference taken alone or in combination with the Munger et al. and Albert et al. references.

Applicants respectfully submit that the present invention as disclosed in dependent Claims 2-7, 11, 14-19, 21, 26, 27, 29, 30, and 31 and are not anticipated by the Anerousis et al. reference, taken alone or in combination with the Munger et al. and Albert et al. references since they depend on one of the allowable base Claims 1, 13, and 25, as previously discussed. Specifically, embodiments of the present invention as described in Claims 2-7, 11, 14-19, 21, 26, 27, 29, 30, and 31 for analogous arguments set forth above with respect to independent Claims 1, 13, and 25, each describe in part that each node in a plurality of web server nodes of the web server cluster can act as a

front end node in establishing a TCP/IP communication session with the client or as a back-end node in processing the web request from the client. As such, dependent Claims 2-7, 11, 14-19, 21, 26, 27, 29, 30, and 31 are in a condition for allowance as being dependent on one of the allowable base claims 1, 13, and 25.

CONCLUSION

In light of the amendments and arguments presented herein, Applicants respectfully request reconsideration of the rejected Claims for allowance thereof.

Based on the arguments presented above, Applicants respectfully assert that Claims 1-34 overcome the rejections of record. Therefore, Applicants respectfully solicit allowance of these Claims.

The Examiner is invited to contact Applicants' undersigned representative if the Examiner believes such action would expedite resolution of the present Application.

Respectfully submitted,

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